

Abstract of the Disclosure

A solid picture element that transfers charges completely from a photodiode portion to an amplifying transistor portion to substantially eliminate residual images and methods of its manufacture are disclosed. The solid picture element includes a buried photodiode and a transistor in communication with a transfer gate that is a selective transfer path for charges from the photodiode to the transistor. The charge accumulation region is located so that it is not in contact with the upper surface of the semiconductor substrate and so that a margin of the charge accumulation region is located 0.0 to 0.2 μm closer to the transistor than any portion of the depletion prevention region. Methods of manufacture of the picture element of the present invention include using the transfer gate as a mask and implanting ions into a semiconductor substrate at a first angle to form the charge accumulation region and at a second, steeper, angle to form the depletion prevention region. Alternative methods of manufacture include sifting a portion of a mask to sift end margins of the charge accumulation region and the depletion prevention region to achieve the desired geometry.